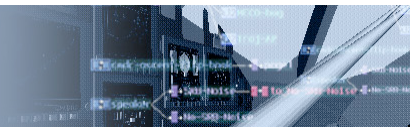MIDAS
man-machine integration design
and analysis system

The Man-machine Integration Design and Analysis System (MIDAS) 4.0 Beta

Software Training Documentation Draft

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San José State
UNIVERSITY

Brian Gore
SJSU/NASA AMES
Human Systems Integration
Division
MS 262-12
Moffett Field CA 94035-1000
bgore@mail.arc.nasa.gov

Shelly Scott-Nash
Alion Science and
Technology's
MAAD Operations
Boulder, Colorado
sscott-
nash@alionscience.com

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Training Overview Steps

The training overview walks a first time MIDAS user through the basic steps of getting a simple MIDAS model executable. The Jack™ environment is pre-built for this exercise. This section is followed by sections that more fully detail how to build the Jack™ environment from scratch.

Installing MIDAS

Initial Install

- You need to have the free .NET environment to run MIDAS.
- If you do not have the .NET software
    - http://msdn.microsoft.com/netframework/downloads/updates
    - Select "Download x86 version" of .NET Framework Redistributable Package
    - Download and install
    - Note, when you first launch MIDAS following the initial installation of the .net software, a task progress window will appear that will run through approximately 10-15 seconds of progress bars. No definition is provided by the .net download. It is noted here for information purposes only.
    - **IMPORTANT NOTE**: When operating over a network, Apex operates most smoothly when your network security is set at its minimum levels. You will get the following error "unable to connect to host: Hostname, Connection timed out" {where hostname is the name of your local machine upon which you are installing MIDAS} if your firewall settings are set too high.
- You also need to have the most recent version of the free Java runtime environment. Sherpa requires (and will not start without) JRE® version 1.4, a product of Sun Microsystems. Note, this software is already built into the Macintosh (OS 10.3.x) and is freely available for the other platforms.
- If you do not have the Java runtime environment
    - Please download it from Sun's website: http://java.sun.com/, or specifically, the Windows JRE: http://www.java.com/en/download/windows_ie.jsp
    - This file will install itself automatically into the appropriate folder (Program Files) and will be called whenever Sherpa launches
    - **IMPORTANT NOTE**: For Java to be correctly loaded, please be sure to restart your computer
    - For help with the Apex software please consult: http://apexdoc.pbwiki.com/3_0_0ReferenceManual#AppendixAGettingStartedwithApex
- Locate the Windows Installer Package, Midas-4.0 Beta with an .MSI extension
- Copy the .MSI file to the machine you want to install MIDAS on
- Double Click on the .MSI file. If you inadvertently did not check whether you have the .NET software available on the machine you are installing MIDAS on, you may be prompted to download the latest version of .Net Framework.

™ Jack is a UGS trademark name

Updated install (when new releases of the MIDAS software are released)
- Open Control Panel and select Add/Remove Programs.
- Remove MIDAS
- Follow the instructions above to install the updated MIDAS version
- ".midas" analysis files you've created with the previous version will not be automatically removed.

Starting up Jack™

The Jack is an independent piece of software. It needs to be purchased from UGS, Inc. Once you have this anthropometric software, you will be able to view the CAD environment.

Start the Jack™ License server
- Double click the lmtools icon
- Click on the Start/Stop/Reread tab
- Click the Start Server button

Start Jack™
- MIDAS operates with Jack™ version 5.1
- Double click the Jack™ icon
- You should see an empty Jack™ environment
- Use the File/Open menu in Jack™ to load the Training Environment for this exercise. Look for a file named TrainingOct112006.env
- Note: you will need to have all of the Jack™ figure files on your local system or network so that the Jack™ software will be able to generate the desired images.

Hints for Navigating in Jack™
- Moving the viewpoint of a window will let you zoom in/out or rotate the scene.
    - In the toolbar at the top, click on the eye icon, the text below it will read View Control
    - In the window that appears, click on the Move button
    - Use the left mouse button to rotate the view right and left, or up and down
    - Use the right mouse button to zoom in and out
    - Use the middle mouse button to move the view up and down
    - The buttons can be used in combination
- Moving an object
    - In the toolbar, be sure Fig is selected in the drop-down menu
    - Press the icon of the hand with the pointing finger
    - Scroll the mouse over the object until it turns yellow
    - Click on the object to select it
    - Verify that the object you want is the one listing in the text box left of the hand icon
    - Hold the left mouse button and move the mouse back and forth to move the object in the X-direction

- Hold the middle mouse button and move the mouse back and forth to move the object in the Y-direction
- Hold the right mouse button and move the mouse back and forth to move the object in the Z-direction
- Move a few of the images you loaded around to get a feel for how it works, and to separate them
- Rotating an object
    - Select object you want to rotate, click on the object with right mouse button (arrows will appear under the origin of the object)
    - Press and hold shift key on keyboard
    - Press left, right or center mouse button to rotate along the X, the Y, or the Z plane
- Getting an object's location
    - In the toolbar, be sure Fig is selected in the drop-down menu
    - Press the icon of the hand with the pointing finger
    - Scroll the mouse over the chair until it turns yellow
    - Click on the chair to select it
    - Verify that the object you want is the one listing in the text box left of the hand icon
    - Read the X, Y, and Z locations out of the cm: textboxes on the right side of the toolbar
- Getting the location for a piece of an object
    - In the toolbar, be sure Site is selected in the drop-down menu
    - Press the icon of the hand with the pointing finger
    - Scroll the mouse over the object until the text reads the name of the piece you are looking for
    - Click on the object to select it
    - Verify that the object you want is the one listing in the text box left of the hand icon
    - Read the X, Y, and Z locations out of the cm: textboxes on the right side of the toolbar
- Saving the environment
    - Go to the file menu and select save scene
    - Name the filename you would like to call the scene (e.g. INL-Training). Note, the .env extension will automatically get added to the filename.

Start the CPORT Module
- Click on the Modules menu
- Select Plug-ins
- In the Registered Modules menu click on CPort
- Click the Load button
- Verify that the CPort menu option now has an asterisk in front of it
- Click the Ok button

Open the CPort Command Window
- Click on the Modules menu

- Select CPort -> Open Command Port
- Verify that the mode is Normal
- Verify that the state is Active
- Verify the status is Waiting in yellow text (this will change to green when the port is sending information)
- Note the port number for later, then press dismiss

Get the Jack™ IP Address
- Open the main Windows Start menu
- Navigate to All Programs -> Accessories -> Command Prompt
- In the window that comes up type ipconfig
- Find the line that says IP Address . . . .
- Note the number in that field for later (this should be a number like 169.254.19.61

Setting up MIDAS

Starting the application
- IMPORTANT NOTE – When operating over a network, Apex operates most smoothly when your network security is set at its minimum levels
- Double click the MIDAS icon Or Select Midas from the NASA Ames group under the Windows Start Programs menu
    - o If you happen to double click the MIDAS icon twice, it will open two versions of MIDAS and two versions of Apex. This is not as problem, simply close one of the open Apex's.
- Verify the Allegro Common Lisp Console window opens
- Verify the console reads CL-USER(1):
- Start Sherpa
    - o Verify the Sherpa window opened
    - o Agree to the Sherpa license in that window
    - o Open the File menu
    - o Select Load Application
    - o Go down one directory from the one that opens in the dialog box
    - o Select midas.lisp. This file has communications information in it for the sockets protocol.
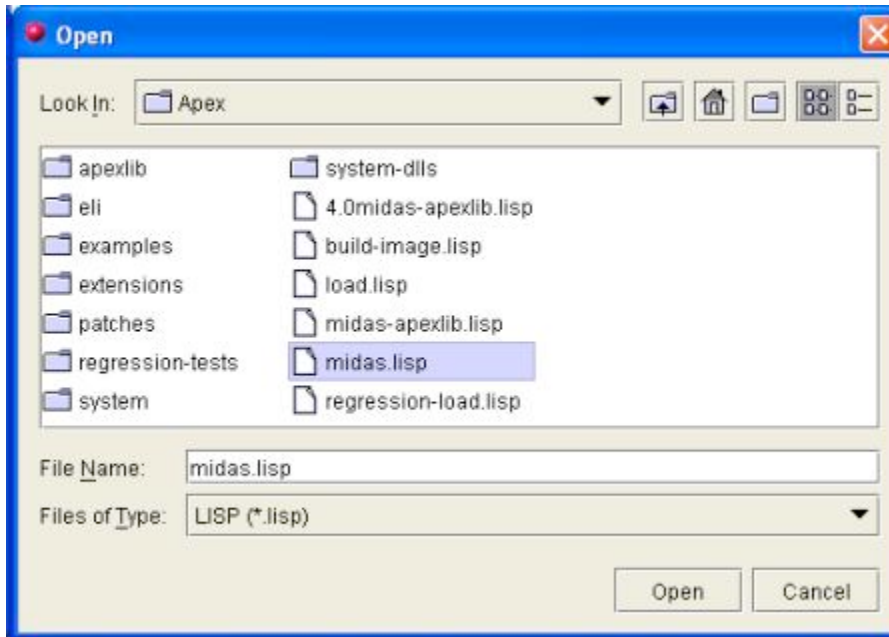
- o Click the Open button
- o Verify that the Allegro Common Lisp Console now reads Staring midas server …
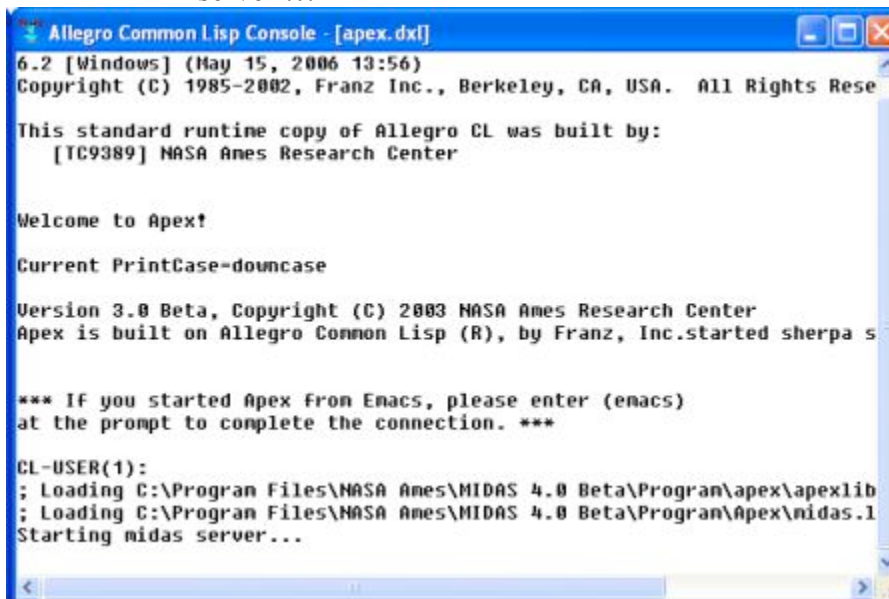
Using MIDAS

This training manual is organized in a manner consistent with how one would design a simulation and attempts to track the organization of the tree view that appears in the MIDAS software.

Creating a Project
A project is a collection of simulation definitions. Simulation definitions are a collection of models where models are operators, operator procedures, vehicles, crew stations, environments, events and situational awareness weightings.
- Select the Save As… menu option under the File menu
- Navigate to a folder where you would like your projects to be saved
- Enter a name for your project in the File name text box and select the Save button

Sidebar: All the simulation definitions and models are stored in files with the .MIDAS extension. If you would like to give your project to a colleague, you will need to give them this file plus any files created on the Jack machine. It's useful to keep all your Jack files for a given analysis in a subfolder for easy portability.

Tip: Select the floppy disk icon on the tool bar from time to time while working to protect your work should you loose power or experience an irrecoverable software error.

Creating a Simulation
- Select the simulation created by default when the project is created. Look for User Simulation 1 in the Tree View under Simulations
- In the property grid, type the name you would like for your Simulation in the Name field under Identification. "TrainingDemo" Under runtime settings
    o Set Connect to Apex to True
    o Set Animate Simulation to True (this allows you to see the visualization from the jack software)
- Set Sim End Time to 20 seconds
- After you have created Models below (Environment, Operator, Vehicle, Event Set), you will be reminded to assign them to this Simulation
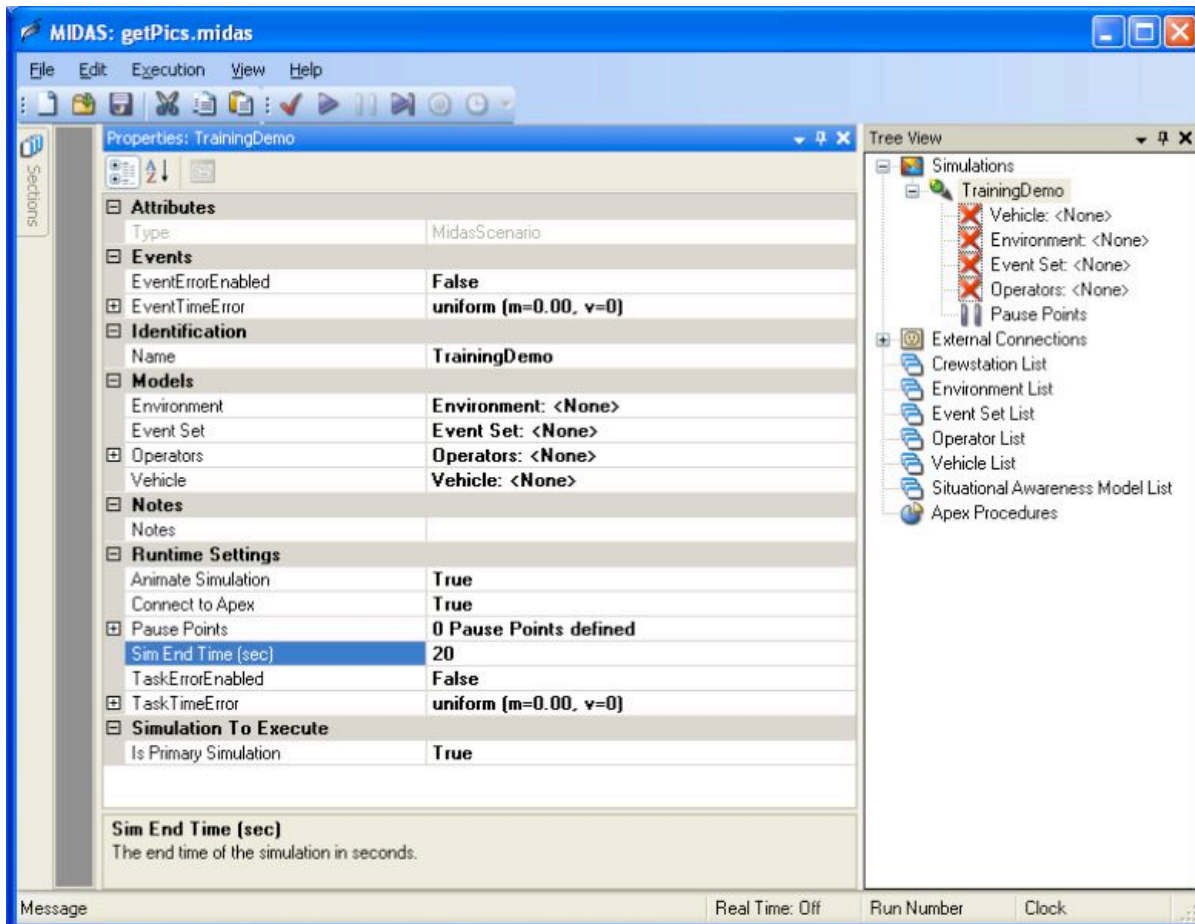
Side bar: If you'd like to create an additional Simulation, right click on Simulations in the Tree View and select Add Simulation from the context menu.

Side bar: The red X's indicate that there has been no model definition applied to the component model (e.g. no vehicle, environment, event set, or operator have been defined yet). In the beta version of MIDAS, there needs to be one model defined in each component classification

Setting up the External Connections
- Expand External Connections in the Tree View by clicking on the + to the left of it
- Set up the Apex Engine
    - ○ In the Properties window, the IPAddress should read 127.0.0.1 (this is your local host since Apex was started on your computer when you started up MIDAS)
    - ○ The IPPort should read 5557
- Set up the Jack™ CPort
    - ○ In the Properties window, type the Jack™ IP Addresses in the IPAddress field.
    - ○ **Hint**: to get the Jack™ IP address. Go to the Jack™ machine
        - • Do Start from Windows and select "Run…"
        - • In the cmd prompt, type ipconfig

- o Type the Jack™ Port into the IPPort field.
  - Hint: This is usually 1250 for Jack™.
 - You can verify by loading the CPort plugin in Jack™.
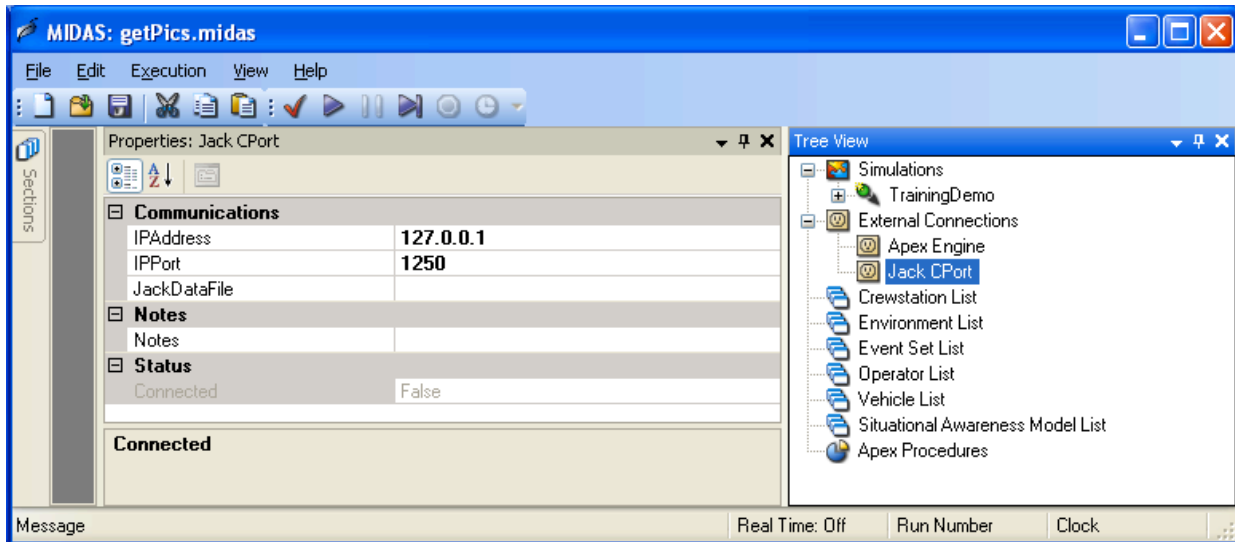
The Simulation Scenario Being Modeled in this Training Effort
It is necessary to outline the simulation scenario that you will be building at the present time to give some of the instructions the proper context. The scenario you will be building is meant to exercise the MIDAS model development environment, the procedure development environment, and the Jack CAD simulation environment. Made up of a human operator in a control room, with 5 monitors and 3 wall screens that reflect the displays of the main monitors, a keyboard & 5 trackballs to interface with the monitors. You will be defining a simulation of a Process Control Room operator conducting an normal internal scan of some of the pieces of equipment in his world. Specifically, the Control Room Operator's goals are to:
1) Monitor the five displays and responding to both visual and auditory alerts in the simulation.
2) Begin with a nominal scan of the monitors
3) Respond to an auditory alarm by reaching the keypad with his left hand and acknowledging the alarm -- note this causes a change one of the monitors to display emergency information, which is also displayed on the wall screen.
4) Receive a request from his supervisor to check pressure values. He looks up with an emergency scan pattern and checks for a pressure value over 80. He comprehends the information displayed on the screen extracting required information. During his scan, the far left monitor gets into hibernation mode hence lowering his situation awareness and workload.

Setting up the Crew Station List

- Right Click, on CrewStation List in the Tree View and select Add Crewstation from the context menu
    - o Select the newly created Crewstation named Crewstation 1
    - o Type "Control Room" in the Name field
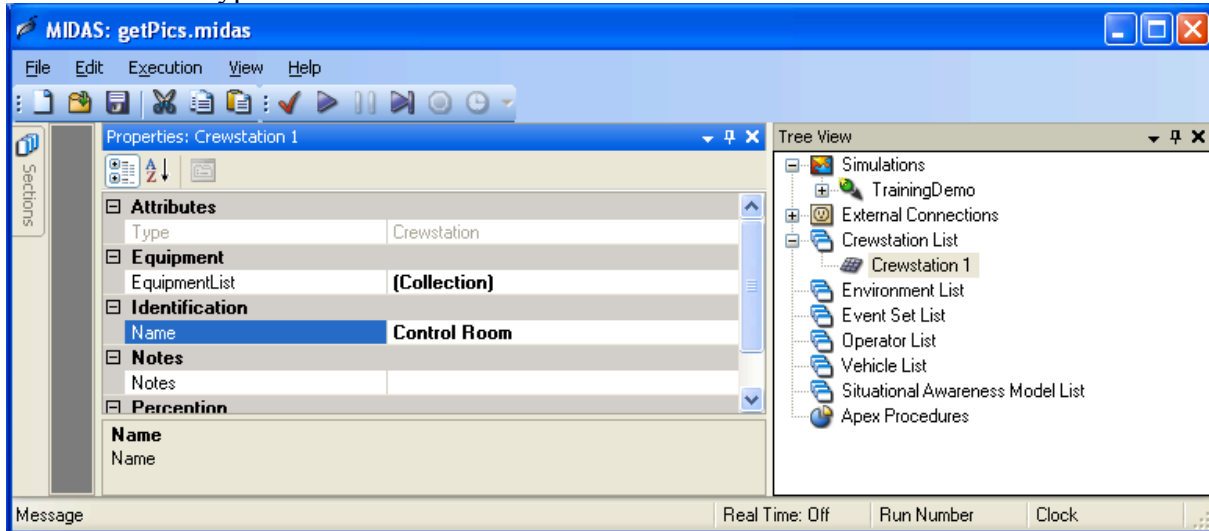
- Right click on "Control Room", select Add Component
    - o Add Discrete State Component (DSC)
   - o Type "keyboard" in the Name Field
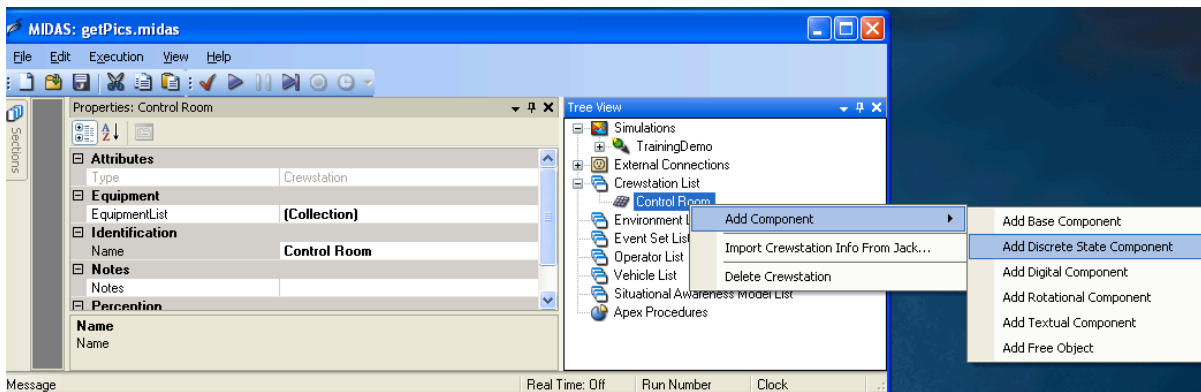
- Right Click on Control Room, select Add Component,
    - o Add Discrete State Component (DSC)
    - o Type "Primary Center Monitor" in the Name field
- Right Click on Control Room, select Add Component,
    - o Add Rotational Component
    - o Name it tball-far-left
    - o Repeat for tball-center-right, tball-primary-center, tball-center-right, tball-far-right
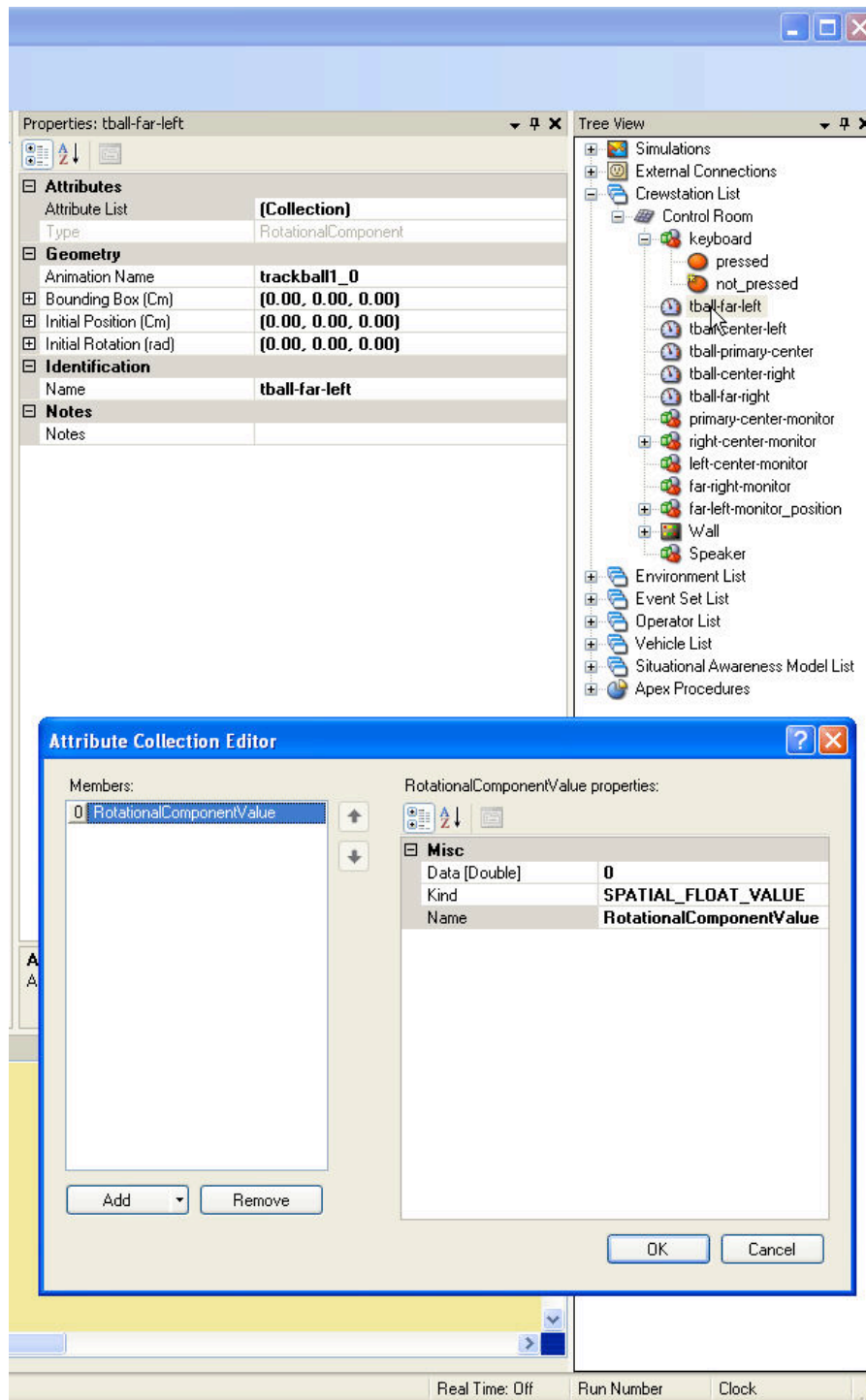
- Right Click on Control Room, select Add Component,
  - Add DSC
  - Name it "primary-center-monitor"
- Right Click on Control Room, select Add Component,
  - Add DSC
  - Name it "right-center-monitor"

- Right Click on Control Room, select Add Component,
  - o Add DSC
  - o Name it "left-center-monitor"
- Right Click on Control Room, select Add Component,
  - o Add DSC
  - o Name it "far-left-monitor_position"
- Right Click on Control Room, select Add Component,
  - o Add Base Component
  - o Name it "Wall"
  - o Add 2 DSCs ("center", and "far right") to the Wall
- Right Click on Control Room, select add Component,
  - o Add DSC "Speaker"
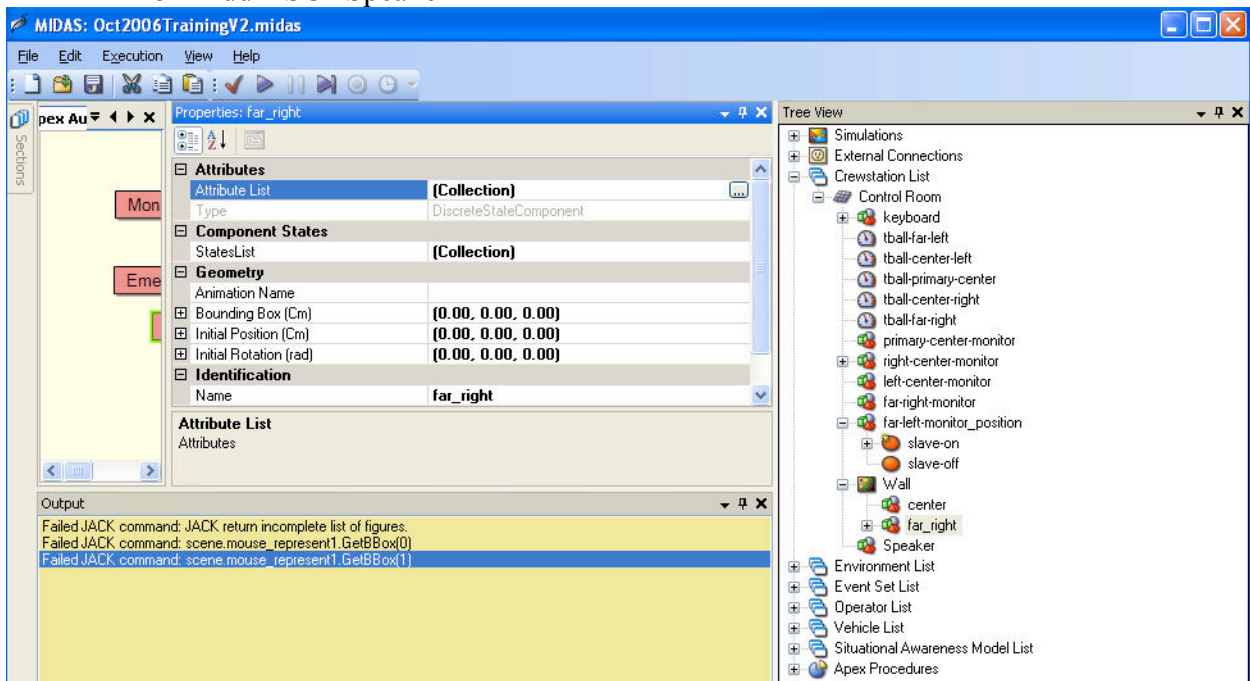
Sidebar: base components are non changing components, discrete states should be used for objects like a keyboard

Important Note: if you want to delete component or any crewstation piece of information from the MIDAS window, right click your mouse ontop of the item of interest. This will bring up a list of possibilities including add and delete among others that are contextually determined. Choose the delete option and this will remove the component from the list.

Configuring Component States
- Right Click on the Keyboard and select Add State
- Name the state "pressed".
  - Assign a transition state to this
    - Click on the pull down menu and select "ControlRoom_right-center-monitor_emergency_mode" {it is likely that only emergency_mode will be visible in the pull down window}
- Add another State to Keyboard named "not pressed"
  - Set the initial state to True under Misc settings (this will display a little star on the tree view graphic or a red, round circle)
- Add 2 States to Right Monitor
  - Call them "normal_monitor_mode" and "emergency_mode"
  - Set "normal_monitor_mode" as the initial state.
- Add 2 States to Right Wall
  - Call them "Blank" and "Emergency"
  - Set Blank as the initial state.
- Add 2 States to "far-left-monitor_position"
  - Name them "slave-on" and "slave-off"
  - Set "slave-on" on as the initial state
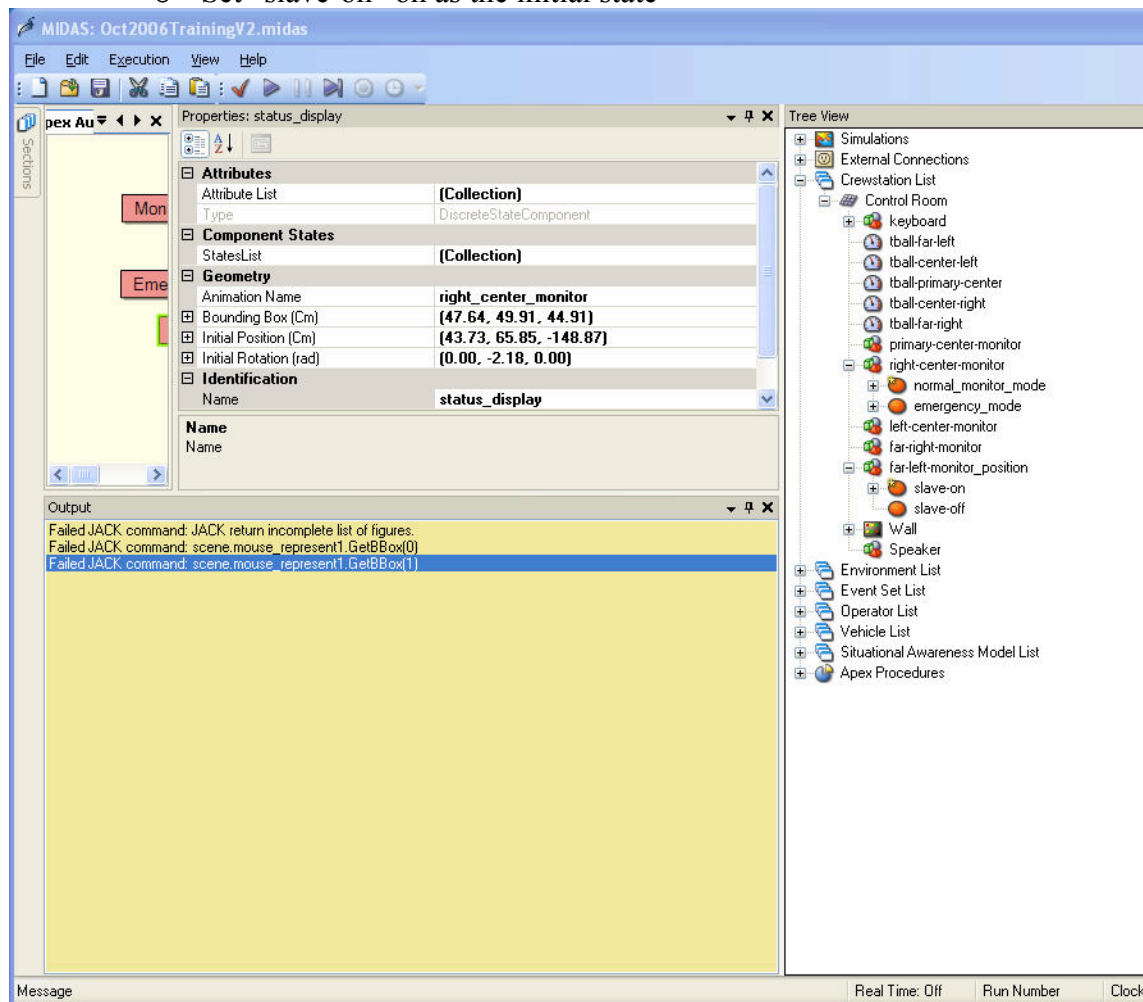
Configuring Component Interactions
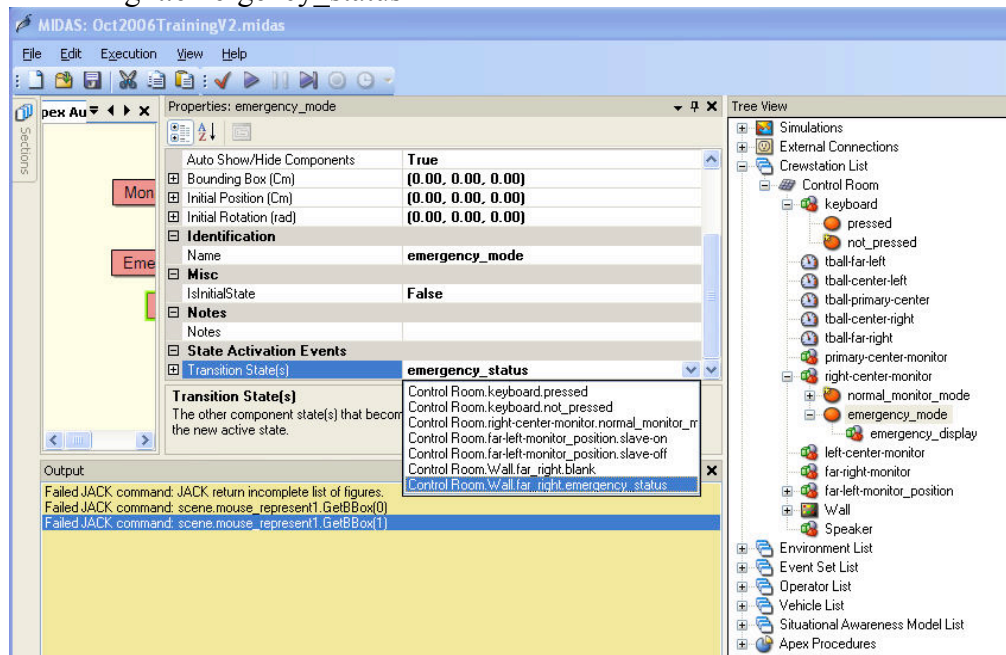
- Cause the "right-center-monitor" to change to the Emergency State when the Keyboard is pressed.
    - o Select the "pressed" state under Keyboard
   - o In the Transition States Field, select Right Monitor, Emergency state.
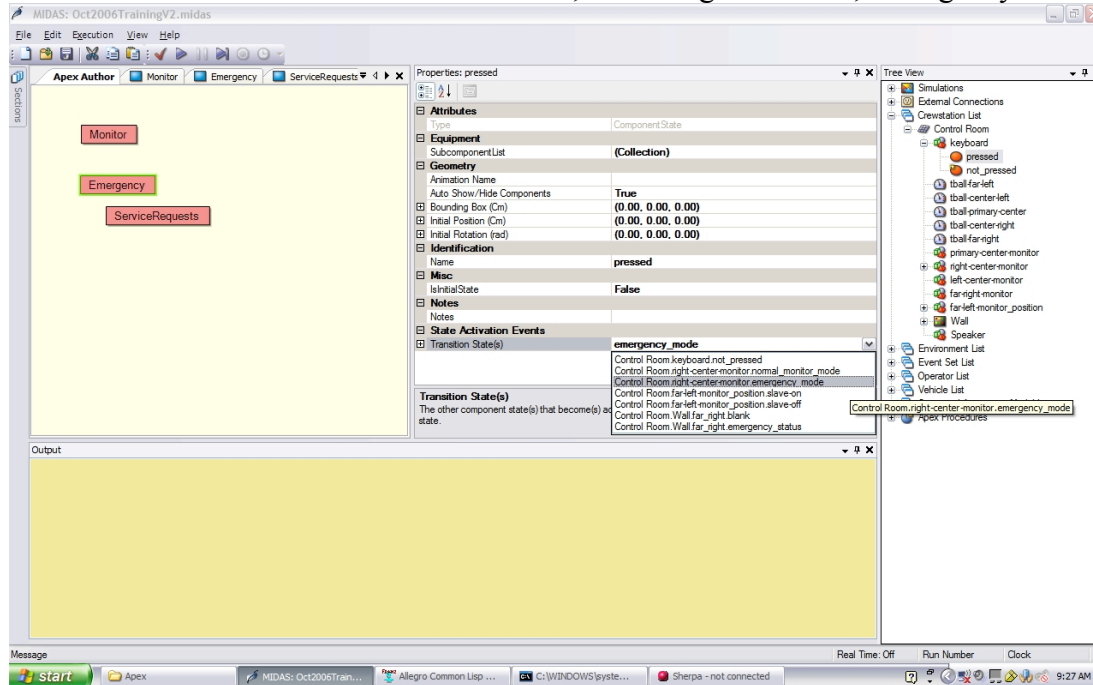
- Select the "emergency_mode" state of the "right-center-monitor"
- In the Transition States field select "ControlRoomWall.far-right.emergency_status"

Adding a Component State, a second component, Add Display state
- Add a new component state
- Select the component state by left clicking the mouse on the state of interest
- Right click the state to add a component to the state (can be either a discrete state, a base, a digital, rotational or textual component)
- In the case of a DSC, begin in the properties window and proceed to define the Geometry information.
    - Mouse click in the Animation Name field of the "Properties:" window (the middle pane).
    - Animation name – select the default identification name ("discrete state component") and insert the name you would like to call this display (e.g. "normal_monitor_mode").
    - Set the Auto Show/Hide Components to "True"
    - Set the initialState to "True"
    - Select the "normal_monitor_mode" in the tree view
    - Add a DSC to this "normal_monitor_mode" and call it "status_display"
    - Type in the <u>Jack file name</u> to which you want this component tied in the "Animation Name".
    - E.g. "right_center_monitor"
    - This will bring in all of the XYZ values from Jack when the crewstation information is mapped between MIDAS and Jack
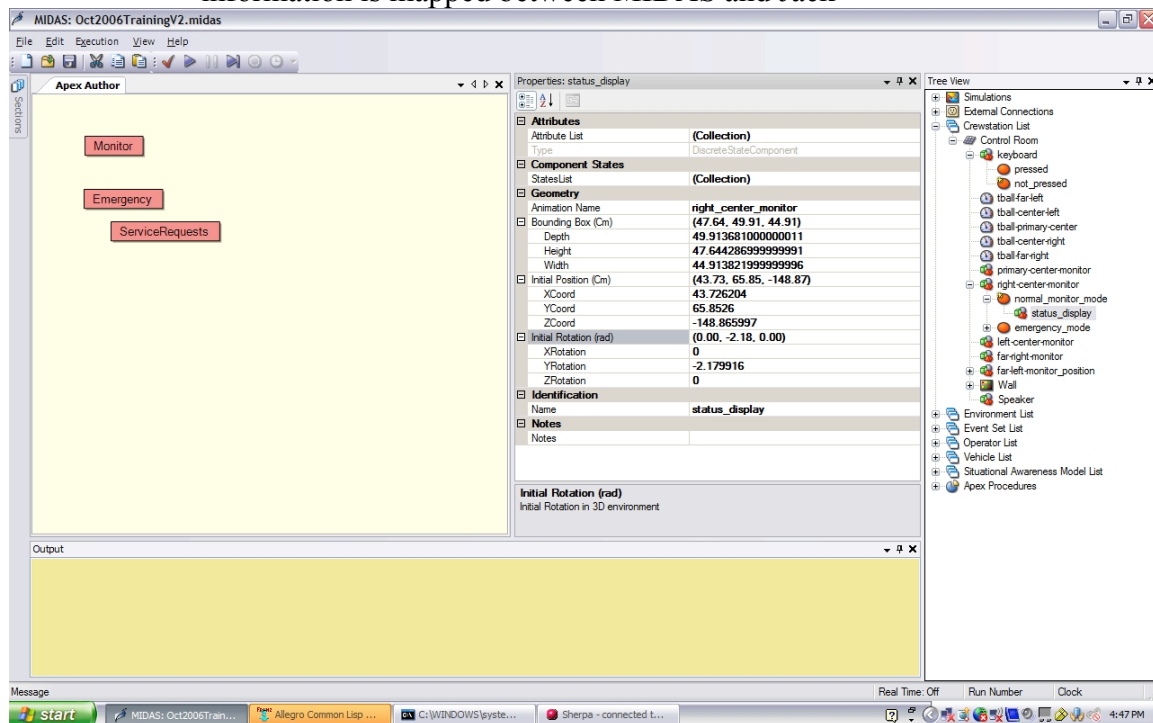

- Add another Component state called "emergency_mode"
    - In the Properties window, Geometry section, type the Animation Name "blank-to-on" in the Animation Name's field.
    - Set initial state to false (although it likely already is set to false because it is dependent on the "normal_monitor_mode" initial state.

- Add a state called "emergency_status" (this will be defined when we define the wall components).
  - Add a DSC onto "emergency_status" called "emergency_display"
 - Type "right_center_monitor_emergency_display" in the Animation Name Field.

Adding Attributes to Component States
- Select the tball component and define it as a rotational component attribute with spatial float values
- To do this click on add, then define the values as needed in the "RotationalComponentproperties" along the right side of the Attribute collection editor.
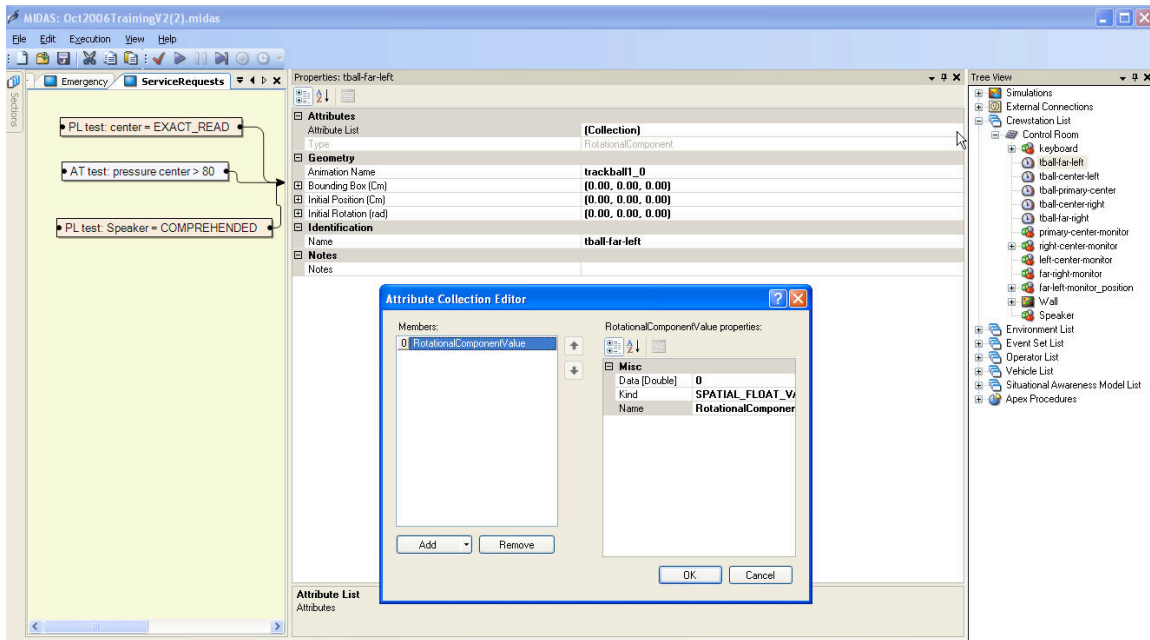
Adding Attributes to Displays and Sound Emitters
- Select the far_left_monitor_position" DSC
- Select the state "slave-on"
  - Add DSC "far_left_Wall_display"
  - Add DSC "far_left_monitor_on"
  - Select "far_left_Wall_display"
    - Click on the attribute field to show the ellipse
    - Select the ellipses (…) in attribute field and select the add button. This will add a Visual Attribute.
    - Add "emergency procedure" Attribute to "far_left_Wall_display"
  - Name it "emergency_procedure"
  - Set the Kind to Text
  - Type "procedure steps" in the text field
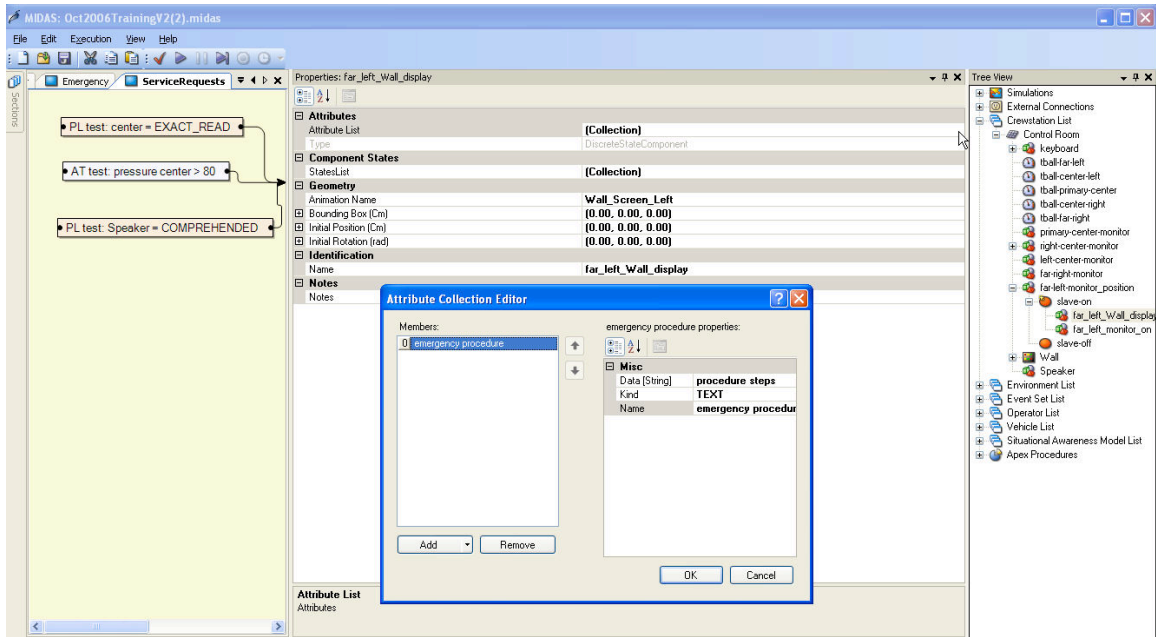
- Return to the far right wall that was added under the Wall base component
  - Add 2 States "blank" and "emergency_status" with blank as the initial state.
  - Add a DSC to "emergency_status" named "emergency_status_wall_display"
- Now go to the center wall display
  - Add a visual attribute named "pressure". It is a DIGITAL_INT. Give it an initial value of 10 psi.
  - Hint: Select the down arrow of the New Attribute Value field to type in it.
- Finally, add 2 Auditory attributes to the Speaker
  - One is "auditory alarm tone" that is Sound Emitting.   Set the initial state to False.
  - The other is "Supervisor", a Speech attribute.
    - The initial value is set later so you don't need to type in a string.
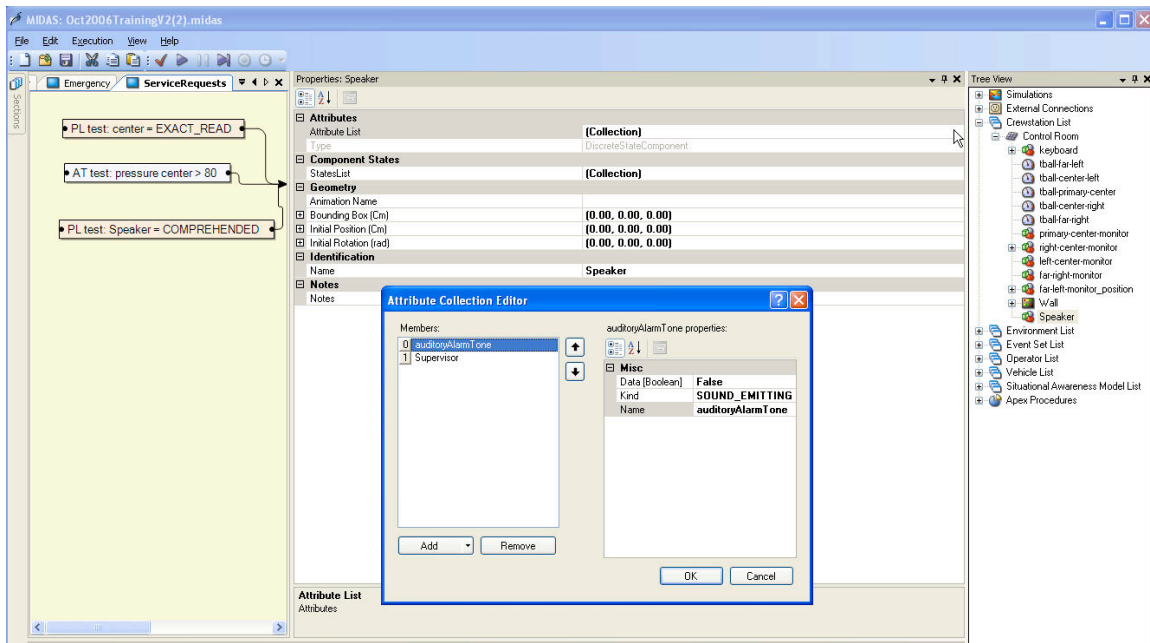
Create Scan Patterns
- Select the "Control Room Crewstation" from the Crewstation list
- Use the ellipses under the Perception area to add 2 scan patterns
- Name the first "monitor scan"
  - Add all the monitor displays to the scan pattern
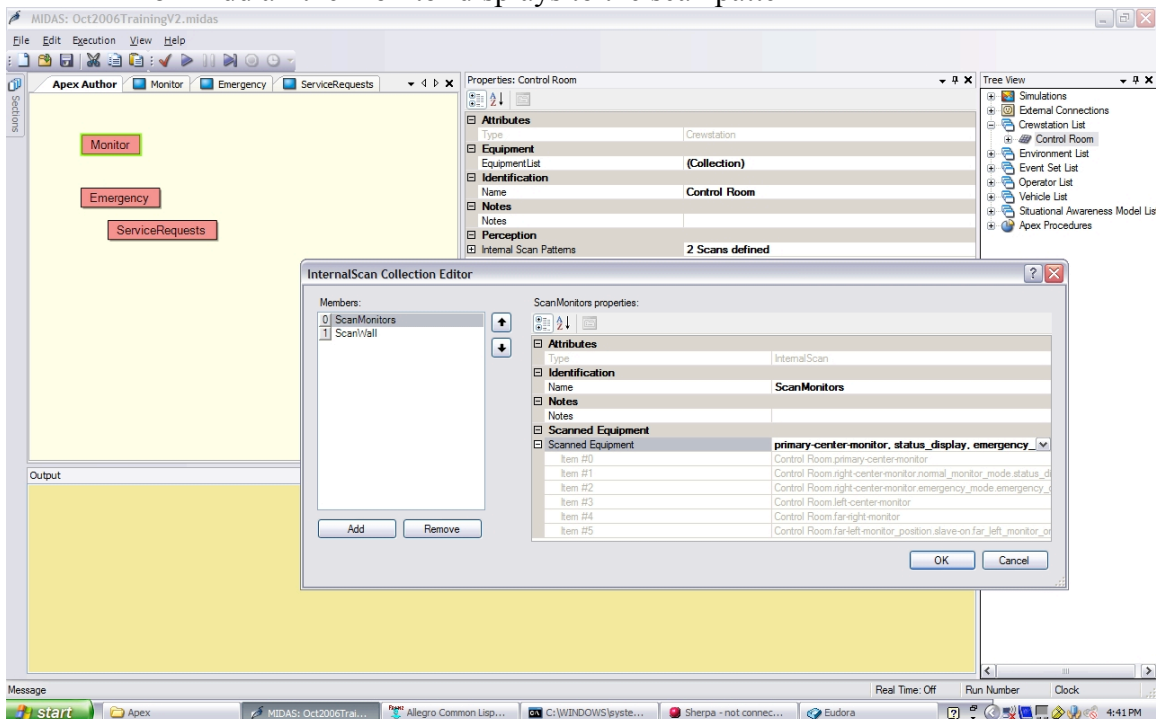
- Name the second "emergency scan"
  - Add all the wall displays to the "emergency" scan pattern.

Import Crew Station Component size and position from Jack™

In this step we will map the names of component in MIDAS to the corresponding names in Jack™. In addition, the locations of component in MIDAS will be populated with the locations from Jack™.

- Right Click on Control Room and select Import Crew Station from Jack™.
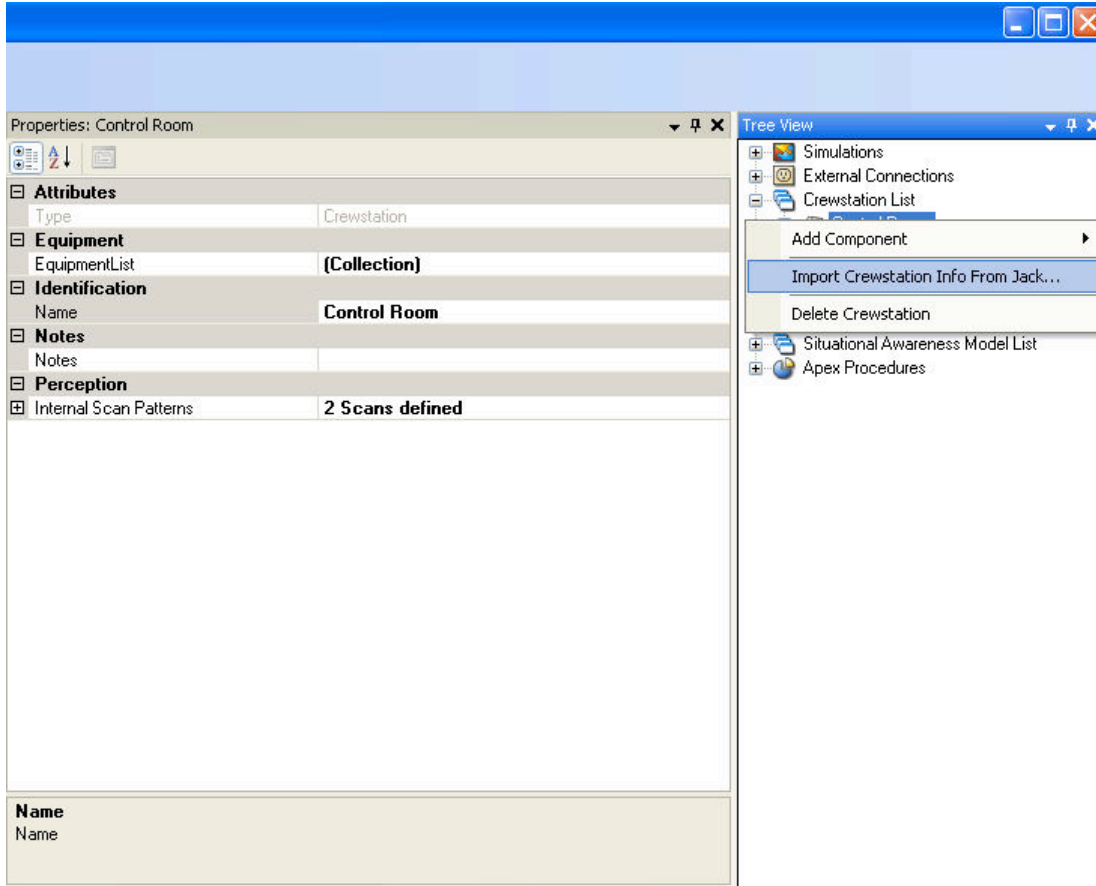
- At this stage, you will want to map the Jack™ figures to the Crewstation components.

- Note the MIDAS component names in left panel.
- Note that not all the figures in Jack™ appear in the right hand panel. *The set of names from Jack™ is too long causing a prematurely terminated communication from Jack™.* To work around this, do the following:
  - Close the import crewstation dialog.
  - In Jack, right click on all the track balls, the track ball bases, the tables and the chair.
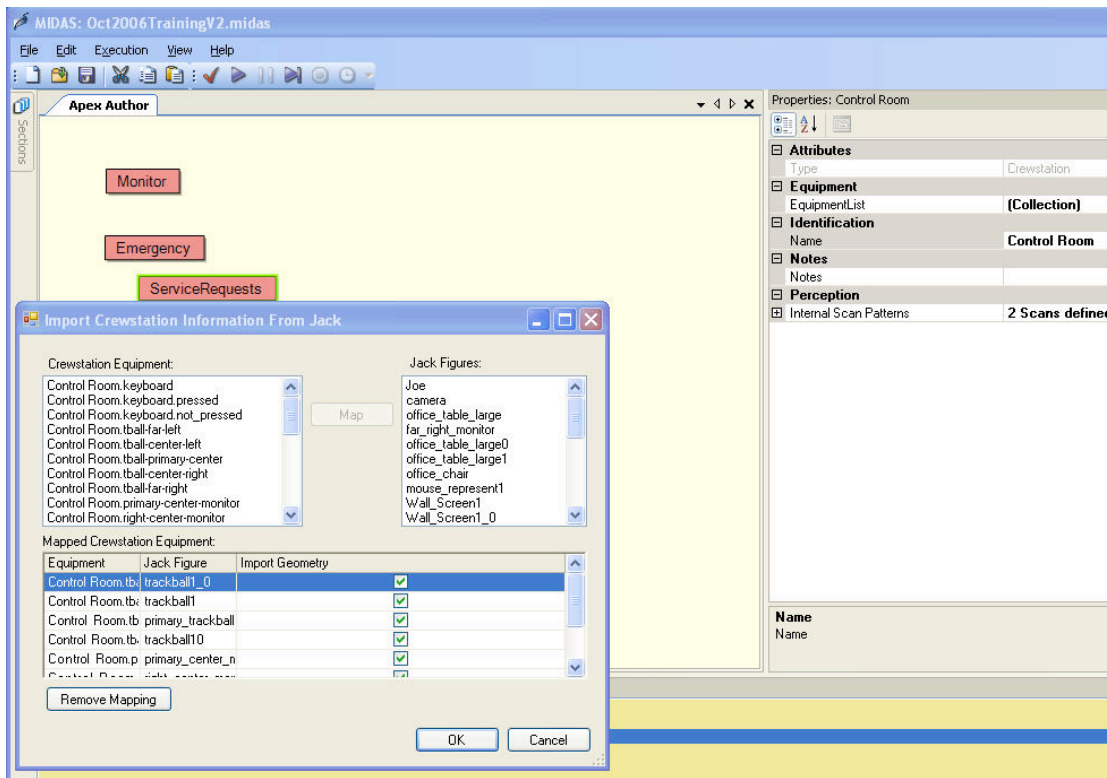 - Delete those objects.
  - Do **not** save the scene. If you do save the scene when you exit, you risk overwriting your original scene with the end state of the simulation.
- Open the Import Crew Station from Jack dialog
  - Map the components from MIDAS to Jack as follows
  - Select the Import button
  - Reset Jack by deleting the Scene and reopening the .env file without saving your changes from the scene with the deleted components.

Side bar: If you move an object in Jack you can update the location by re-doing the above sequence, mapping only the objects you've moved.

- Note: when you bring over the Jack™ files to MIDAS, you will see the files' positional information listed in the MIDAS window as exemplified with the keyboard below.
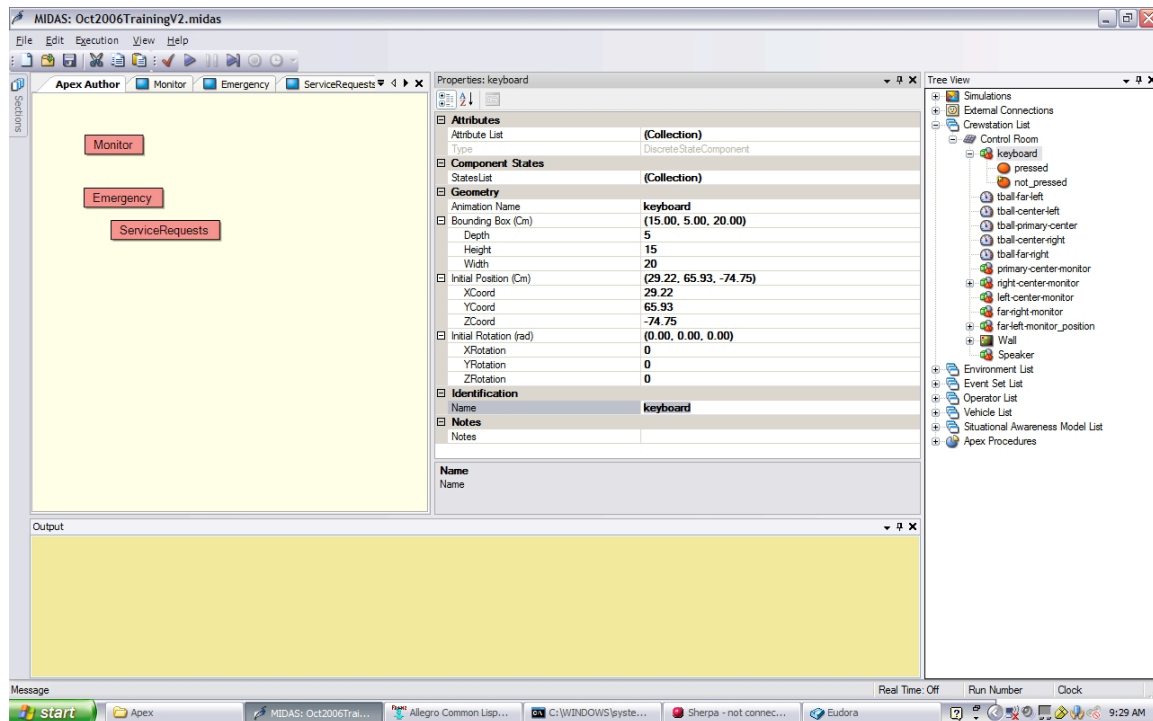
Modeling <u>Side bar</u>: You can change the XYZ location in MIDAS after having imported the XYZ locations from Jack by typing over the respective X,Y,Z value. This will cause Jack to look at the new X,Y,Z value that you inserted. This is a workaround step to get Jack™ to fixate on the correct object site location.

Setting up the Environment List
- Right Click on the Environment List
- Add Environment Model
  - The default settings are fine for the training exercise since the operator is not scanning externally.

Setting up the Event Set List
- Select Event Set List in the Tree View
- Right Click on the Event Set List and select Add Event Set from the context menu
  - Name it Training Event Set
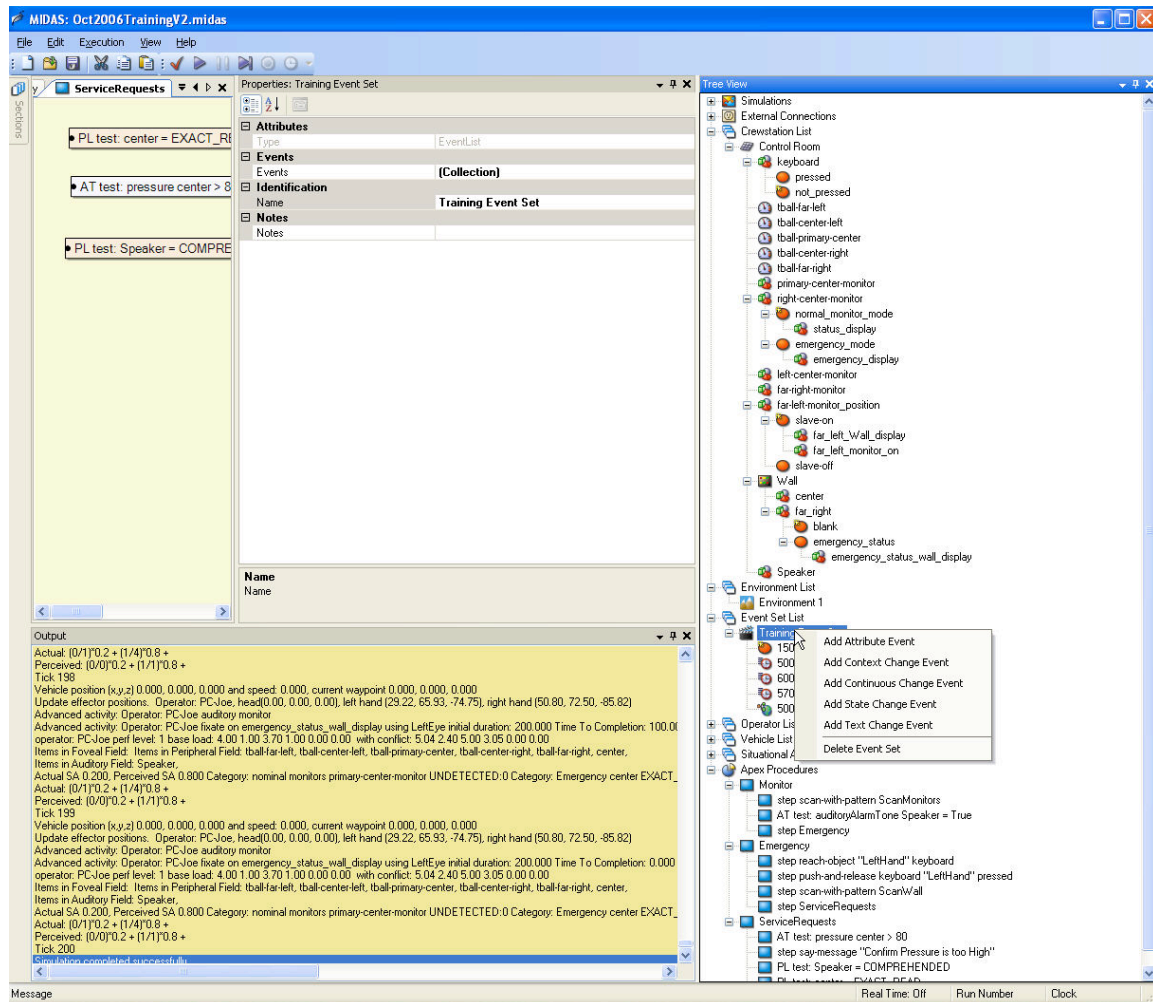
- Right Click on Training Event Set
  - o Add 3 Attribute Events
    - Name the first one "Alarm Tone". Set the auditory alarm tone attribute of the Speaker to True. Set the Time to 5000 msec.
      - Hint: Select the check box before the false.
    - Name the second one "Supervisor Request". Select the Speaker once again. This time set the SPEECH attribute to "Check the pressure!". The time should be set to 5700 msec.
    - Name the third one "pressure rises". The attribute owner is "center wall" and the new value is 100 psi. The Attribute is pressure.
  - o Add One Context Change Event
    - Name it Emergency
    - We'll return here after we create the SA model.
  - o Add One State Change Event
    - Name it "far left monitor hibernates"
    - The time should be 15000 msec. Select the far left monitor and set the new state to slave off.
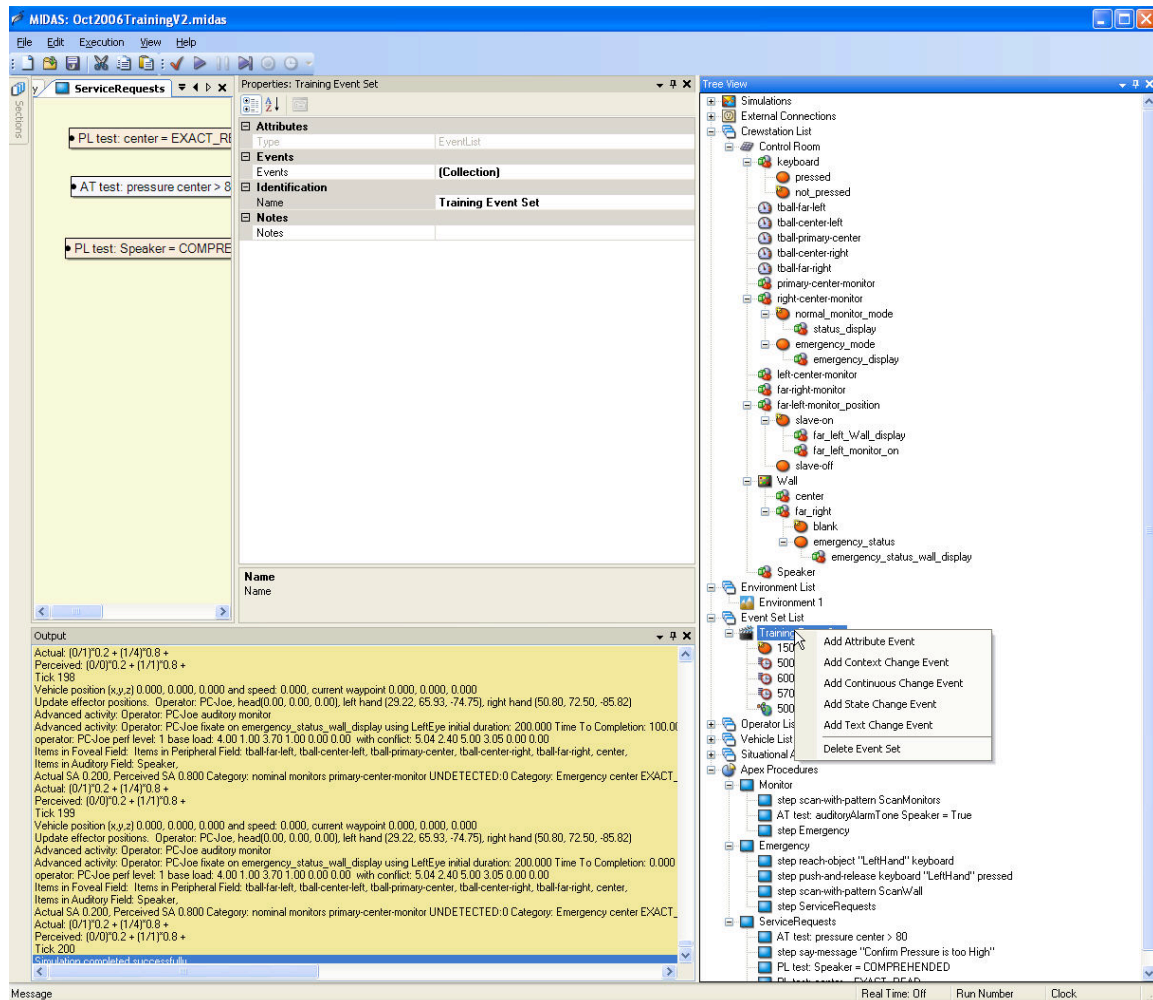
Setting up the Operator List
- Select Operator List in the Tree View
- Right Click and select Add Operator from the context menu
- Type "Joe" in the Name field
- Select the Control Room as the Crewstation model.
- We'll return here after the Apex procedures and SA are defined.

Setting up the Vehicle List
- Right Click on the Vehicle List
- Add Vehicle
- Use the ellipses in the Waypoints field under Guidance model to add one waypoint. The default values are fine since we are not animating the vehicle in this exercise.

Setting up the Situational Awareness Model List
- Right Click on SA model list and add an SA model, named "Situational-Awareness-Model-Training"
- This will automatically load the three components necessary in MIDAS' Situation Awareness model, the .

- Add 5 situational elements (SE) corresponding to the following displays
    - The center and far right wall displays. There are 3 of these.
        - One center display
        - Two right displays corresponding to the blank and emergency states.
    - The far left wall emergency display
    - The primary center monitor
- Create 2 Categories. Nominal monitors and Emergency
    - Assign the primary center monitor SE to the Nominal-monitor Category
    - Assign all the rest, the Wall Displays, to the Emergency Category
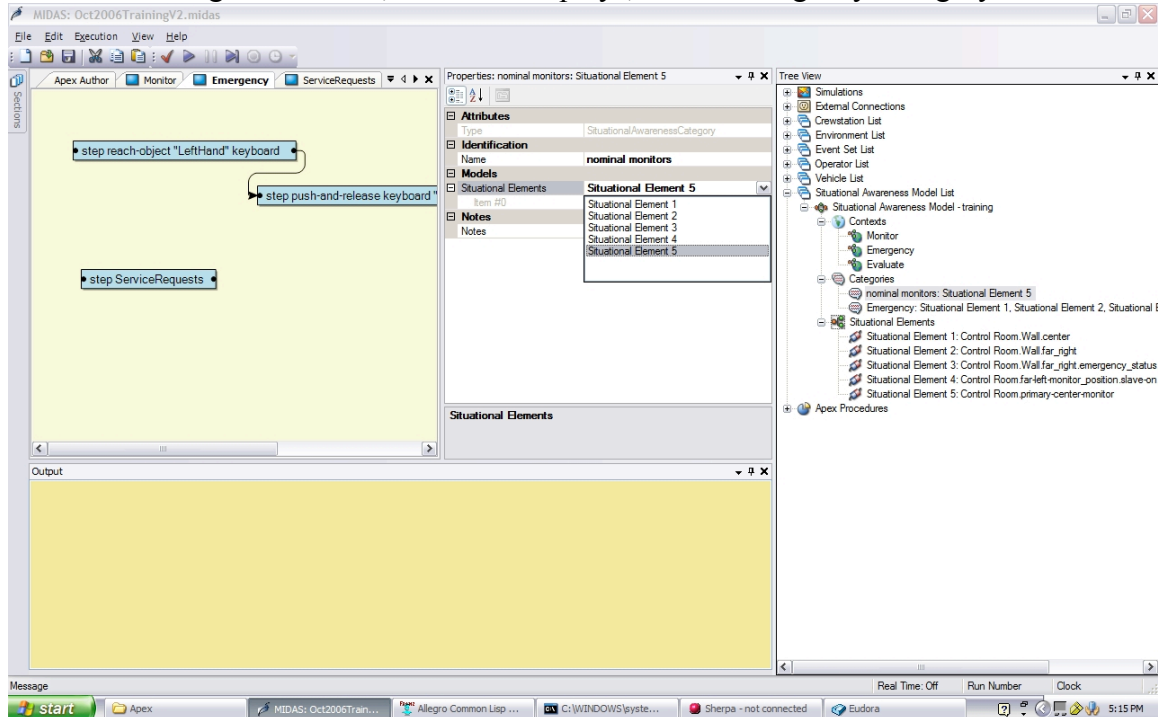
- Create 2 Contexts
    - Name them Monitor and Emergency
   - Select the Monitor Context and weight the monitor category a full weight of "1".
    - Select the Emergency Context. Weight the emergency category .8 and the monitor category .2
- Return to the operator model in the tree view.
    - Select "Training" as the SA model
    - Select monitor as the initial context for the operator.
- Finally return to the event set list.
    - Select the context change event
        - Set the new Context to emergency.

Creating Operator Procedures and Steps
- Create 3 procedures in the Apex Author tab
    - Name them Monitor, Emergency, Service_Requests
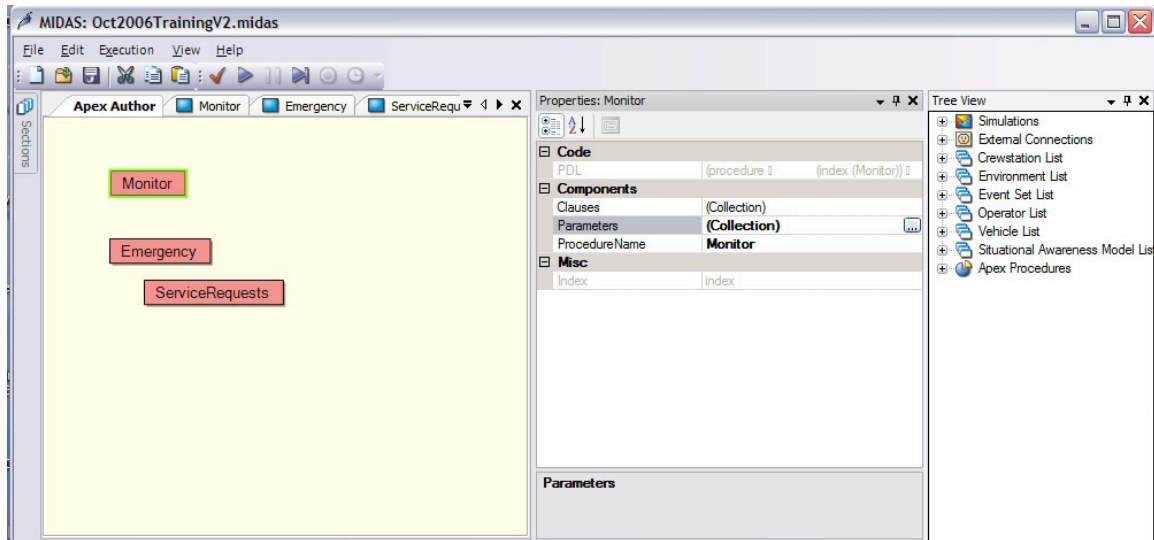
- Drill down into Monitor (double click left mouse button on the monitor icon)
- Right Click to add a step
    - Select the "scan with pattern" as the task description from the pull down menu
    - Set the monitor scan as the argument
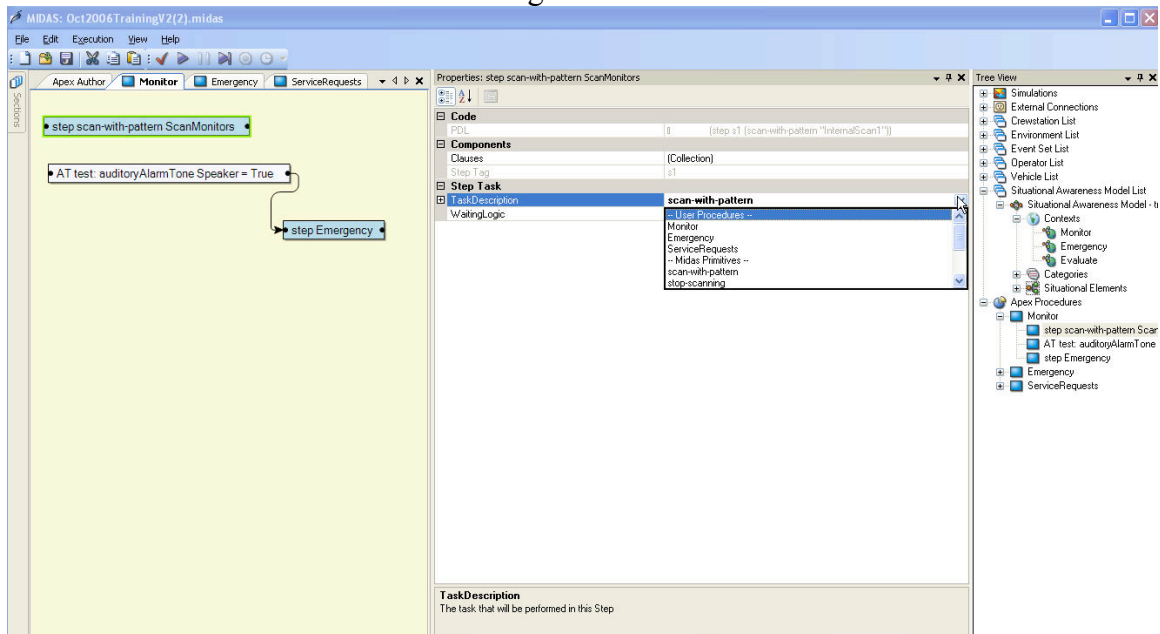
- Add another step (right click in the Author window). Set the task description to Emergency by typing "emergency" in the name text field
- Add an Attribute Test (right click in the Author Window)
    - Select Speaker as the object to check, the attribute to check to auditory alarm tone and the value to True.
    - Then go to the "Attribute to Check" and select the "Sound-emittingAuditoryAlarmTone" from the pull down menu
        - Note, in MIDAS 4.0 Beta, this option is positioned above the "object to check"
    - Set the attribute test as a dependency to the Emergency step.

- o Hint: Hover the pointer near the right far side of the attribute step until the hand cursor displays. Click and drag to connect the arrow to the left side of the Emergency Step.
- Return to the Apex Author tab and drill down into Emergency
  - o Add a step "reach-object" with "LeftHand" to keyboard.
  - o Add a step "push-and-release" keyboard with left hand
    - ▪ Set the state of the keyboard to "pressed"
    - ▪ Set the "reach-object" step and a dependency to this step
  - o Add a step, "scan-with-pattern"
    - ▪ Select the emergency scan pattern
    - ▪ Set the push and release as the dependency to this step
  - o Finally add a step calling the "Service_Requests" procedure.
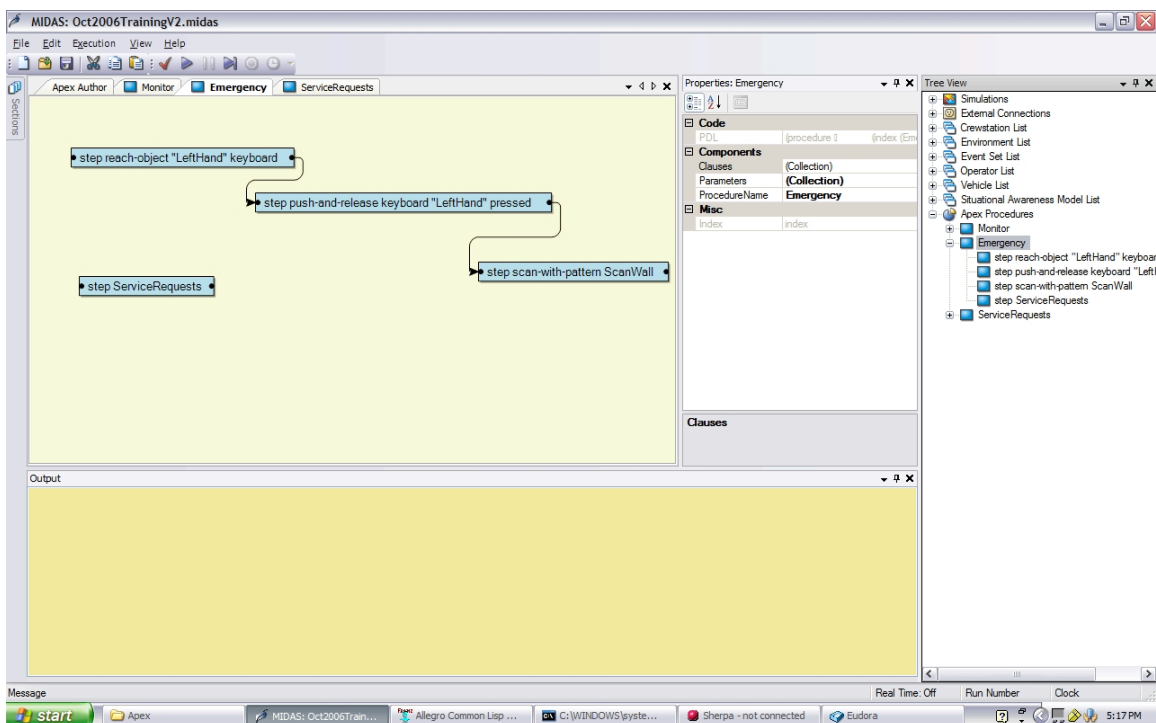
- Return to the Apex Author tab and drill down into "Service_Requests"
  - o Add a "say-message" step. Set the argument to "Confirm Pressure is too High"
  - o Add an attribute test checking for the pressure displayed on the center wall screen to be greater than 80psi
  - o Add a perception level test checking for the Speaker to reach Comprehension
  - o Add one more perception test checking for the center wall display to have reached EXACT_READ.
  - o Make all three tests dependencies of the "say-message" step.
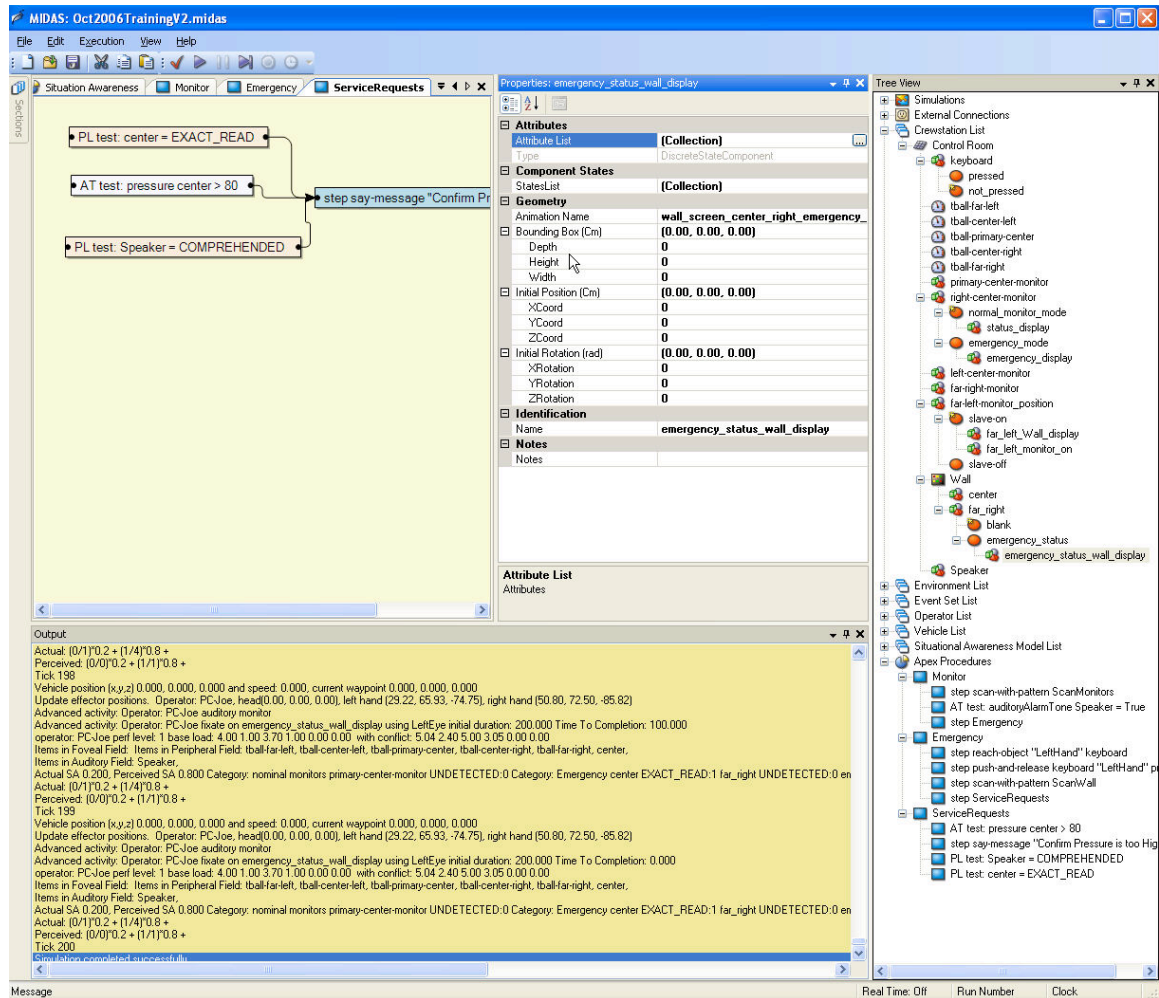
- Return to the operator, "Joe"
  - o Set Monitor as the initial Apex procedure that "Joe" will begin with when the simulation begins.

Assigning Models to a Simulation
- Return to the Simulation, "TrainingDemo"
- Assign Environment to Environment 1
- Assign Event Set to Training Event Set
- Assign "Joe" as the operator
- Assign Vehicle to Vehicle 1

Running MIDAS

Check the model for errors
- Click the red checkmark icon in the MIDAS toolbar at the top of the screen. When the mouse cursor is over the icon it reads Check for Errors
- This will check the model you created for errors that must be fixed before you can begin running the model

- Note the results in the Output window

Play
- Click the forward arrow icon in the MIDAS toolbar at the top of the screen. When the mouse cursor is over the icon it reads Begin Simulation
- Note the Output window scrolling the information, and in the bottom righthand corner of the status bar the Clock ticks off the time. Later we'll look at the Output window in detail
- Verify that the Jack™ Command Window status has changed to a green Connected

Halt
- If the model is still running, click the stop sign icon in the MIDAS toolbar at the top of the screen. When the mouse cursor is over the icon it reads Halt Simulation.
- This causes the model to stop running no matter where it is in its execution.

Pause

Continue

Step

Reading the output window

Reading the Apex window

Trouble Shooting Your Model
- None of the operator activities other than auditory monitor begin.
    - o Check to see if you gave the operator a beginning procedure.
- Nothing at all happens in Jack™
    - o Make sure the animation flag in the simulation settings is set to true.
    - o Make sure the Cport in Jack has been activated.
    - o Did you open the midas.lisp file in Sherpa?
- I see different output when I run the simulation more than once.
    - o The dependencies in Apex may already have been satisfied and Apex is still running
    - o Shut MIDAS down and restart. Apex will reload cleanly.
- I get an error when I open Sherpa
    - o The Apex server didn't quite have time to start up.
    - o In Sherpa, in the File menu, select Reset
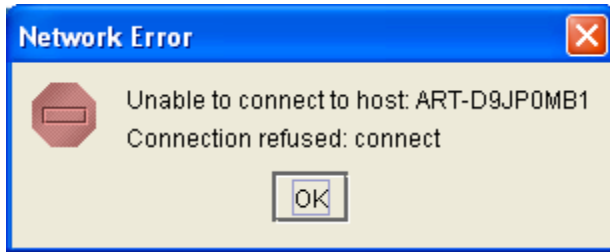
- Temporarily deactivate your firewall settings/programs operating on your system (e.g. Symantec software).
    o To deactivate this, open the firewall program by locating the software icon in the toolbar along the base of the Window OS, click on deactivate.
- Reload Apex/Sherpa

Customer Support

Contact Brian Gore at NASA Ames Research Center.
Brian Gore
(650) 604-2542
bgore@mail.arc.nasa.gov
It's helpful if you have your ".midas" analysis file that you can email to us for inspection.

Setting up Jack™

Start the Jack™ License server
- Double click the lmtools icon
- Click on the Start/Stop/Reread tab
- Click the Start Server button

Start Jack™
- MIDAS operates with Jack™ version 5.1
- Double click the Jack™ icon
- You should see an empty Jack™ environment

Create a Jack™ human
- Click on the Human menu
- Select Create -> Default Male
- Verify the male is now available in your Jack™ window

Load in the Jack™ objects
- Click on the File menu
- Click on Import
- Navigate to the directory containing the image objects
- Select the chair.pss image
- In the window that appears, click the Translate button
- A new window will open, wait until some text scrolls through it until you see "SUCCESS"

- Click the Close button to remove that new window that came up
- Verify the object is now available in your Jack™ window
- Repeat the process for the following images
    - far_right_monitor.fig
    - right_center_monitor.fig
    - primary_center_monitor.fig
    - left_center_monitor.fig
    - far_left_monitor.fig
    - Wall_Screen_Left.fig (this is a figure file that is sitting just on top of the Wall_Screen1_0
    - Wall_Screen_center.fig
    - Wall_Screen_center_right.fig
    - keyboard.fig
    - Wall.fig (this is the wall on the right side of the plane)
    - Wall1.fig (this is the wall on the left side of the plane)
    - Wall-Screen1.fig (this is the wall that has the 3 screens on it)
    - Wall0.fig (this is the ceiling)
    - trackpad_border_1_0.fig
    - trackball_1_0.fig
    - trackpad_border_1.fig
    - trackball_1.fig
    - trackpad_border_10.fig
    - trackball_1_1.fig
    - trackpad_border_10_1.fig
    - primary_trackball.fig
    - trackpad_border_10_0.fig
    - trackball_10.fig
    - office_chair.fig
    - joe.fig
    - office_table_large.fig
    - office_table_large0.fig
    - office_table_large1.fig

- Create a number of CAD objects in jack (for this step you will be creating a table with two monitors on its surface and these figure files will be located in front of the Jack™ anthropometrical figure that is sitting in the chair)
    - Go to >Object >> Create Figure from Library
    - Select the Furniture option
    - Load the office-table-large.pss file.
        - Move the table and place it at –15.75, 0, -22.16
    - Load a monitor from the furniture option (select the name of the figure file and press the load icon)
        - Select the object with the finger toolbar
        - This will load a piece of furniture and will locate it at the 0,0,0 location with 0,0,0 rotation.
        - Place the monitor on the left side of the large table

- E.g. the monitor should be at –3, 66.1, 58.73 with rotation of 0, 90.2, 0.
- Save the scene file
- o Attach the monitor to the table
  - Move your mouse over the monitor, right click, select the "Attach" option
  - Unattach the monitor from the world, attach the monitor to the table
  - the monitor to the table
  - Repeat this step
- o Add another monitor to the right of the first monitor you placed on the table
  - Complete the same steps as above but place the monitor at -1.31, 67.38, -8.1, rotation 0,-90.2,0
  - Attach the monitor to the table as completed above
- o NOTE – attaching the monitor to the table will allow you to move the table with the monitors on its surface as one unit.
- o Create a second large table and place this on the right side of the first table, at an angle of 16 degrees
- o Place one monitor in the center of this table
- o Add a third table, this one to the right of the second table at an angle of –36 degrees
  - This will serve to make a bank of tables with a bank of computer terminals which the jack operator will be set to interact with.

- Load a number of *.pss files into the Jack™ environment.
  - o Select the import option from the File pull-down menu in Jack
  - o Import the relevant jack *.pss file.
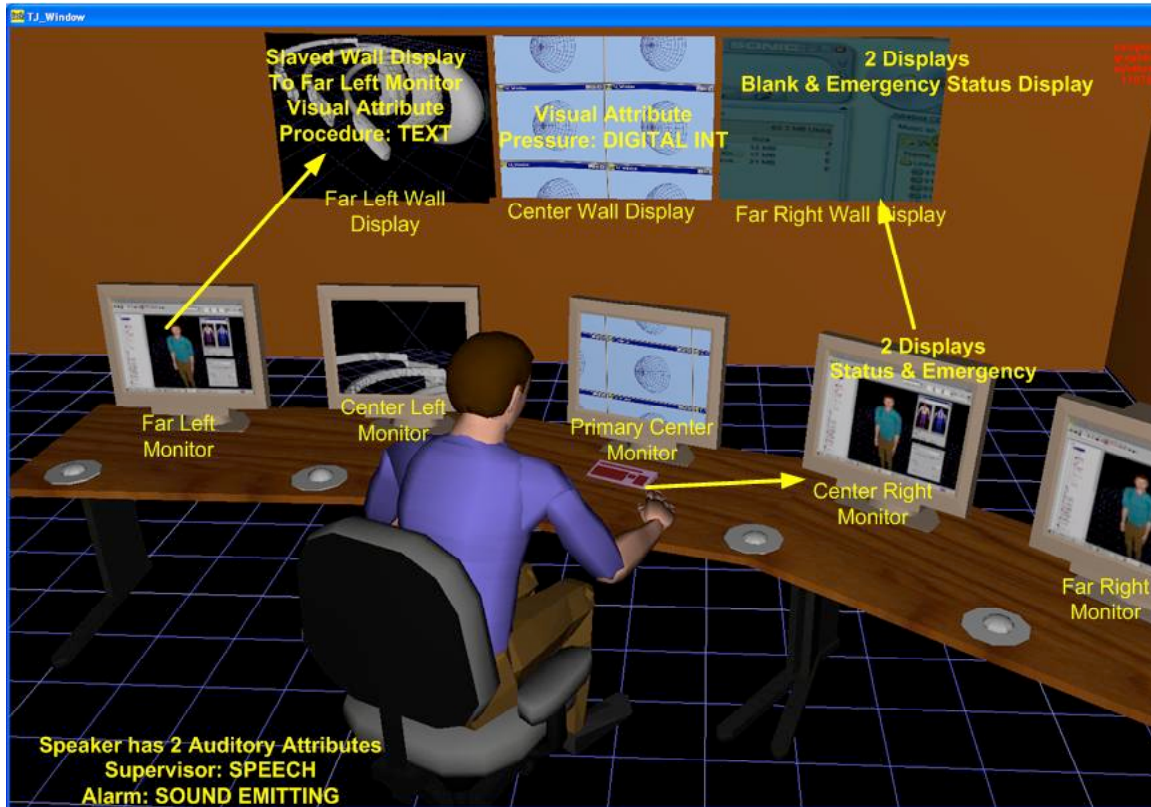
Position the Jack™ objects
- Create a CAD object using the Jack™ software
- Move the chair to location cm = 107.52, -2.75, -40.17; .deg = 2 155.4, -0.1
- Sit Jack™ in the chair – use one of the postures that are contained within the jack software
    - Step 1 create a jack™ figure
    - Save the figure file as a new name – change it from "Human" to "Joe"
    - Hover your mouse over the mannequin and right click. This will bring up a series of actions possible on the mannequin. Move your mouse to the postures choice and select a sitting posture for "Joe"
    - Move Joe (the seated posture of the jack™ human figure) to the desired location
    - Edit the posture by selecting the human control/manipulation option in jack to position the posture given the other CAD objects in the environment
    - Save the posture under a new name (e.g. "Joe_4_training)
- Move the primary_center_monitor in front of Jack™, to his right (get some relative X, Y, Z coordinate – the training simulation has this monitor placed at 10.56, 65.85, -82.26; 0, -110.2, 0)
- Move the active monitor to the same location as the blank monitor
- Set the blank and active monitors to active and inactive

- Move the center_left_monitor in front of Jack™, to his left (the training simulation has –1.31, 67.38, -8.1; deg 0, -90.1, 0)
- Move the center_right_monitor in front of Jack™, to his right (the training simulation has 43..73, 65.85, -148.78; deg 0, -124.9, 0)
- Move the far_left_monitor in front of Jack™, to his left (the training simulation has –3.00, 66.1, 58.73; deg 0, -90.2, 0)
- Move the far_right_monitor in front of Jack™, to his right (the training simulation has 88.59, 67.58, -198.48; deg 5.2, -134.1, 3.6)
- Move the keyboard below the main monitor (29.22, 65.93, -74.75; deg 0, -114.5, 0)

Attach the Jack™ objects
- Attach steps
- Identify the figures that you would like to attach together
- Upon initially creating a figure, it is attached to the world database. You need to un-attach the figure from the world database and attach it to the desired figure file and most importantly, the site location of the figure file. For example, if you are trying to attach jack™'s hand to a hammer, you need to right mouse click on the figure of interest (in this case the hammer), specify attach. This will bring up a properties window of the hammer and this will note whether the figure is attached to anything.
- select SITE in the pull down menu in the jack software, select the finger tool of the jack software, navigate to the jack™'s hand (specifically the palm), click on this location and specify "attach". This will bring up a window that should allow you to select the one
- Use the finger tool to select the figure of interest. This will highlight the figure and will list the XYZ location in centimeters along the toolbar. These are the values that need to go into MIDAS so that MIDAS has an awareness of the end effectors of jack™'s objects and relative locations (the crewstation import function in MIDAS should bring all of the XYZ's over from Jack but in the event that the simulation fails in some regard, double check the XYZ locations.

Create a camera
- Create an object to attach camera to
    - o Go through create object steps
    - o Position the object
    - o Rotate the object
- In the View Control window, click on the hand icon that's to the right of the Attach Object textbox
- Click on the camera object created above
- Note: The attach point is not saved, so this section will have to be repeated each time the environment is loaded

Create a Texture object in Jack™
- Details associated with creating textures will come when the Jack software is able to better handle texture swapping.